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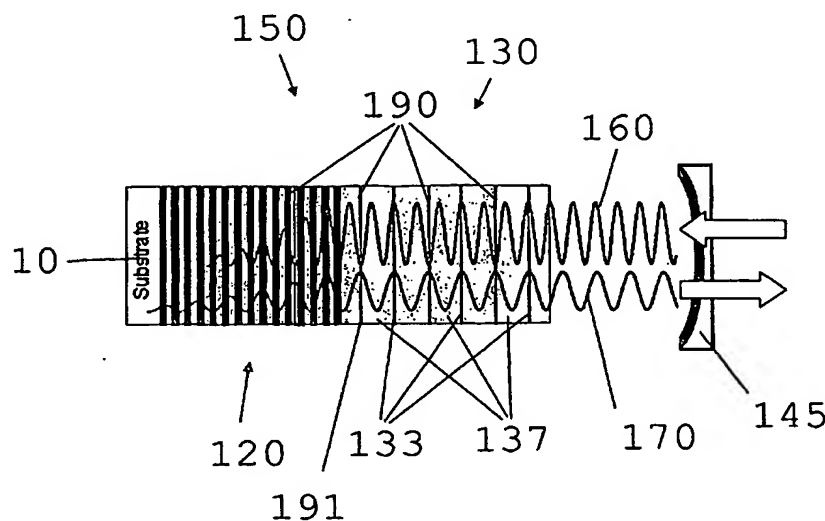
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[Continued on next page]

(54) Title: IMPROVEMENTS IN AND RELATING TO VERTICAL-CAVITY SEMICONDUCTOR OPTICAL DEVICES



(57) Abstract: An optical device comprises: an active semiconductor region (130), for providing gain to signal light (170) passing through said active region (130); a signal-light reflector (120), for reflecting the signal light (170) through the active region (130) in a direction out of the plane of the active region (130); a pump-light reflector (120), the pump-light reflector (120) being arranged to reflect pump light so as to form a standing wave (160) in the device; and an absorber (191) that absorbs light at a wavelength of the signal light. The absorber (191) is arranged at a position in the device at which there is no or substantially no pump light.



TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 H01S5/183 H01S5/04 H01S3/113 H01S5/065

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 H01S

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, COMPENDEX

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02/47223 A (GARNACHE CREUILLOT ARNAUD ; UNIV SOUTHAMPTON (GB)) 13 June 2002 (2002-06-13) page 7, line 13 - line 14; figure 3	20,21
A	abstract; figure 1 page 9, line 29 - page 10, line 8 -----	1-19, 22-27
A	RAJA M Y A ET AL: "RESONANT PERIODIC GAIN SURFACE-EMITTING SEMICONDUCTOR LASERS" IEEE JOURNAL OF QUANTUM ELECTRONICS, IEEE INC. NEW YORK, US, vol. 25, no. 6, 1 June 1989 (1989-06-01), pages 1500-1512, XP000054771 ISSN: 0018-9197 cited in the application page 1501 - page 1502; figure 1 ----- -/--	1-27

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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- \*Z\* document member of the same patent family

Date of the actual completion of the international search

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 01/59895 A (GIGATERA AG ; KELLER URSULA (CH); HAERING RETO (CH); PASCHOTTA RUEDIGE) 16 August 2001 (2001-08-16) abstract; figure 1	1-27
A	----- GARNACHE A ET AL: "SUB-500-FS SOLITON-LIKE PULSE IN A PASSIVELY MODE-LOCKED BROADBAND SURFACE-EMITTING LASER WITH 100 MW AVERAGE POWER" APPLIED PHYSICS LETTERS, AMERICAN INSTITUTE OF PHYSICS. NEW YORK, US, vol. 80, no. 21, 27 May 2002 (2002-05-27), pages 3892-3894, XP001126674 ISSN: 0003-6951 abstract; figure 3	1-27
A	----- MICHLER P ET AL: "EMISSION DYNAMICS OF IN0.2GA0.8AS/GAAS LAMBDA AND 2 LAMBDA MICROCAVITY LASERS" APPLIED PHYSICS LETTERS, AMERICAN INSTITUTE OF PHYSICS. NEW YORK, US, vol. 68, no. 2, 8 January 1996 (1996-01-08), pages 156-158, XP000552697 ISSN: 0003-6951 abstract; figure 1	1-27
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Information on patent family members

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